Development of New Data Acquisition System for Paragon LLC.

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PROBLEM STATEMENT

We aim to create an enhanced Data Acquisition System (DAS) test stand for Paragon Products. The current DAS suffers from fluctuating measurements on the graphical user interface (GUI) that causes concern. We aim to steady the measurements and reduce electromagnetic interference (EMI) to ensure proper data collection and measurement.
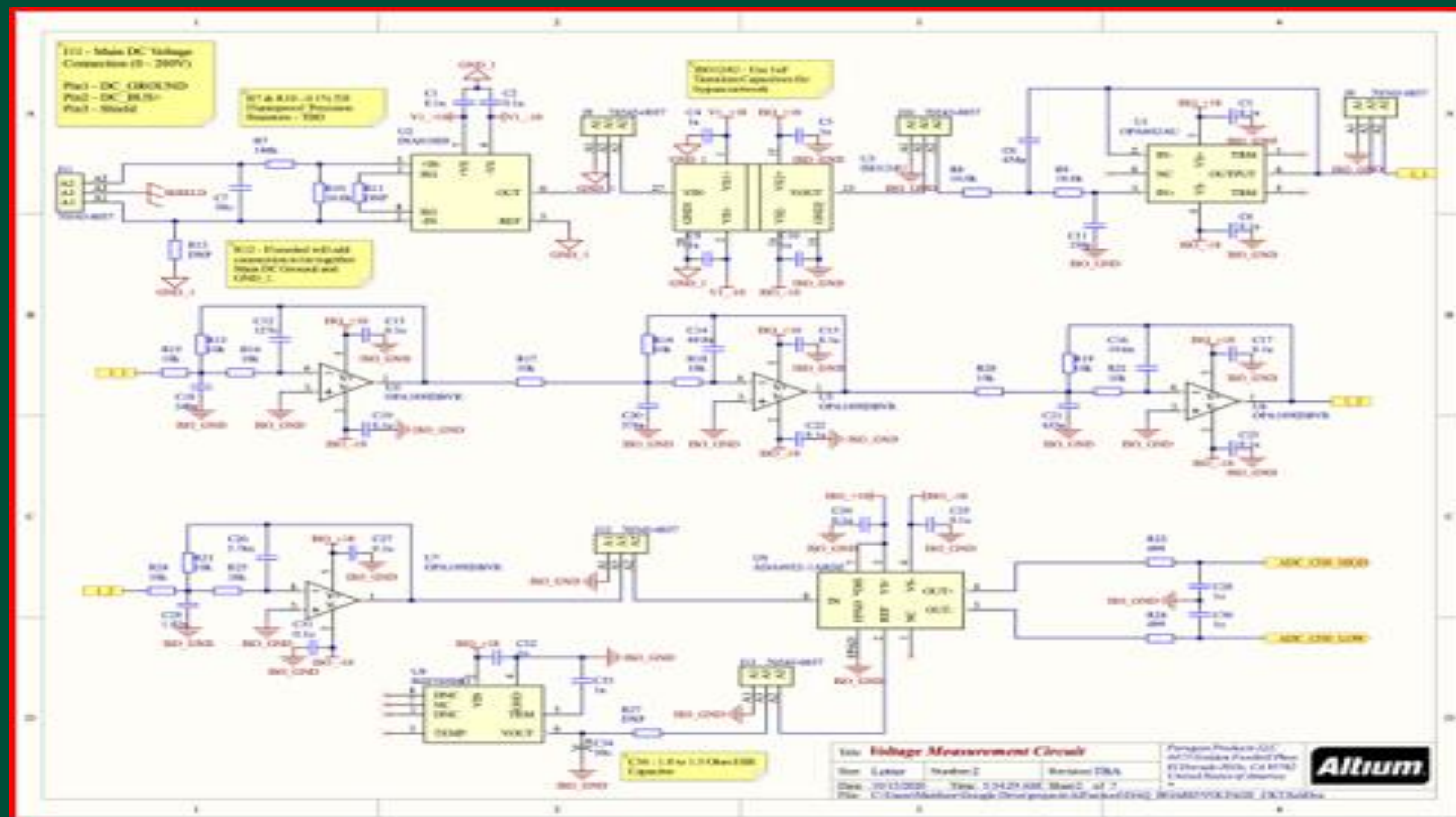

Figure 1: DAQ System Schematic

BACKGROUND

New and improved circuit design
Signal filtering, Signal isolation , Very high SNR/CMRR Customizable signal Gain / Offset Shift, Differential signal outputs to ADC

New PCB board design
5 sensor circuits integrated on same board, integrated power plane / ground routing on PCB layers, Test points / jumpers for easy troubleshooting and circuit isolation, Scalable and reproduceable design, additional analog output headers for self calibration, additional channel inputs for monitoring

SUMMARY OF WORK

After designing the schematic with all of the desired features the next step was to review the schematic with the Paragon engineers. It was approved for PCB production and the finished product is shown below along with some of the results showing the desired results.
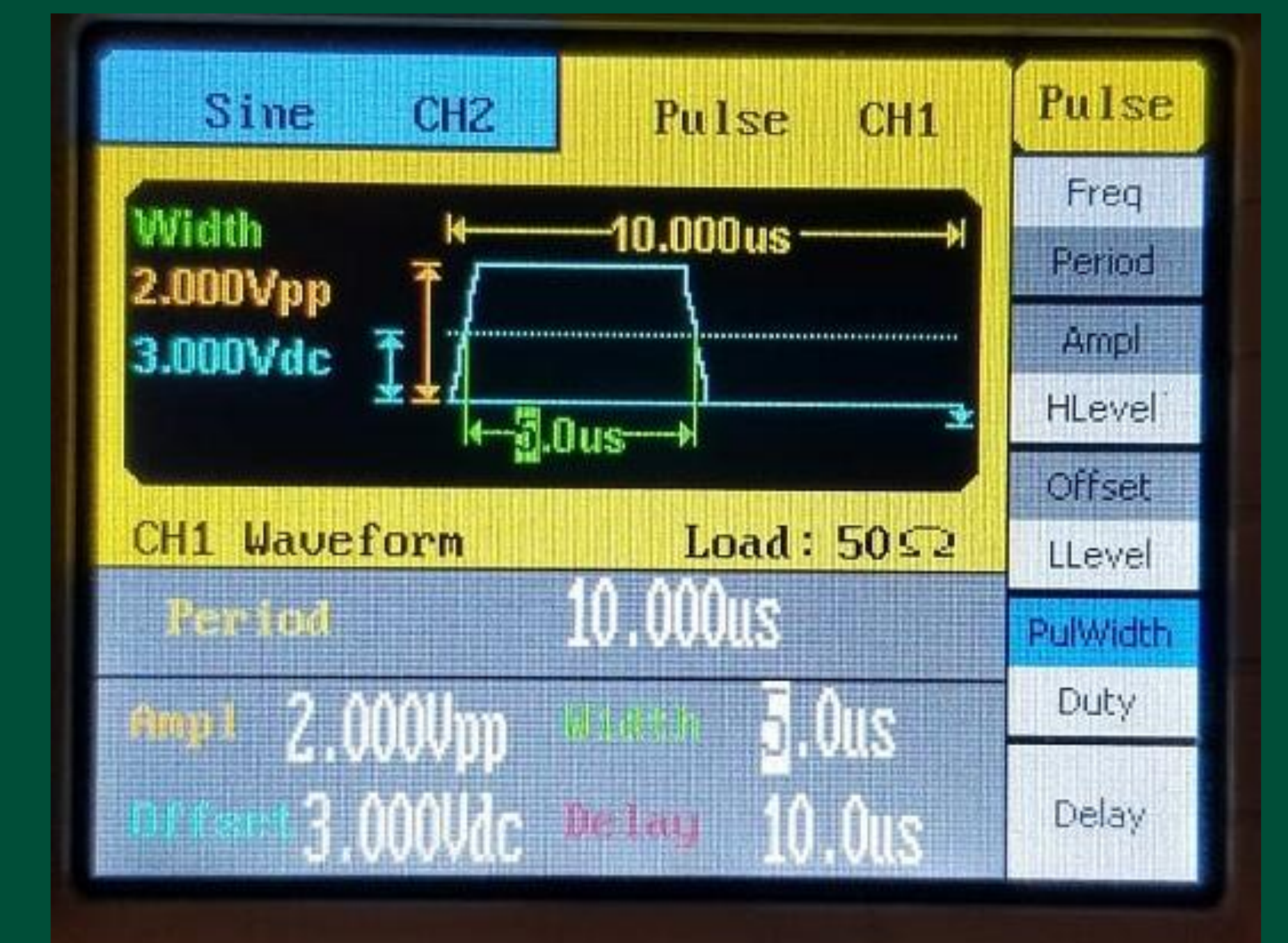

Figure 2: DAQ PCB

Figure 3: Results

IMPACT ON COMMUNITY

Our project meets and exceeds the expectations and requirements set by Paragon to greatly improve signal noise by adding filtering, isolation and a professionally manufactured PCB design.The design addresses the need for easy troubleshooting by adding jumpers and test points throughout the board that will be accessible externally and simplifies the wiring scheme. It can be easily replicated and/or customized to meet different sensor gain/offset requirements and works with all existing test stand hardware to save costs when upgrading. This will also allow for easy reproducibility and low-cost implementation for the other existing test stands (approx. 10 test stands).